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(71) Applicant(s)

Mul-T-Lock Technologies Ltd

(Incorporated in Israel)

Southern Industrial Zone, 70 653 Yavne, Israel

(72) Inventor(s)

Noach Eizen

(74) Agent and/or Address for Service

Gill Jennings & Every

Broadgate House, 7 Eldon Street, LONDON,
EC2M 7LH, United Kingdom

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E2A AARL A100 A160 A190

(56) Documents Cited

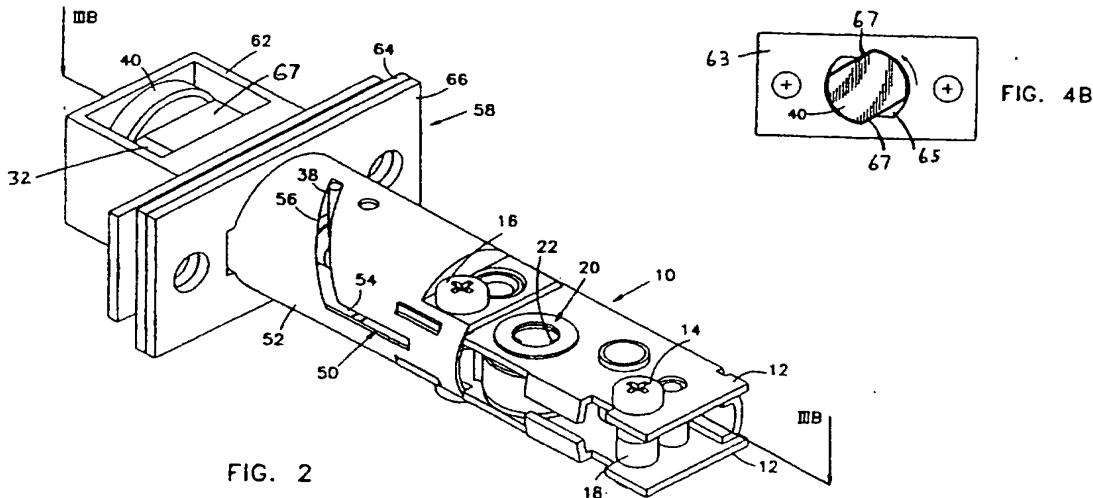
US 4897961 A US 4615550 A US 4566725 A
US 4095827 A

(58) Field of Search

UK CL (Edition N) E2A AARE AARL
INT CL⁶ E05B 63/12, E05C 1/06

(54) Locking device for deadbolt

(57) A locking element (40) at one end of a sliding deadbolt (32) is automatically rotated to a locked position by the sliding movement of the deadbolt (32) into a receiving strike (62), so as to prevent withdrawal of the deadbolt (32). The locking element (40) has the same part circular section as the deadbolt (32) and can pass into the strike (62) through a hole (65) in its front plate (63). The locking element (40) is then rotated about the deadbolt axis by a pin (38) engaging a cam slot (56) in a cylinder (52). The deadbolt (32) is caused to slide by means of a finger rotated by a key operated lock cylinder or by a knob.



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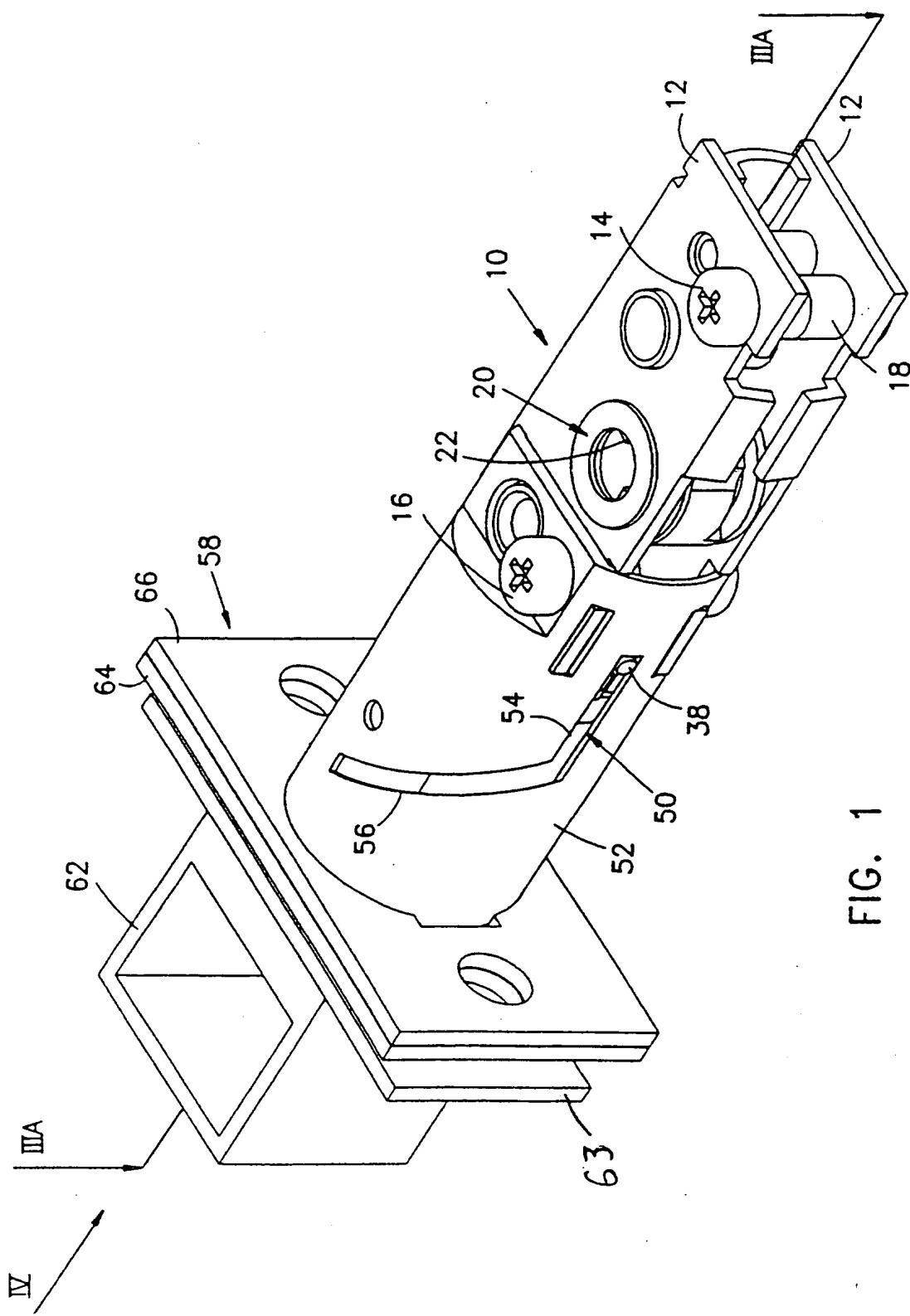


FIG. 1

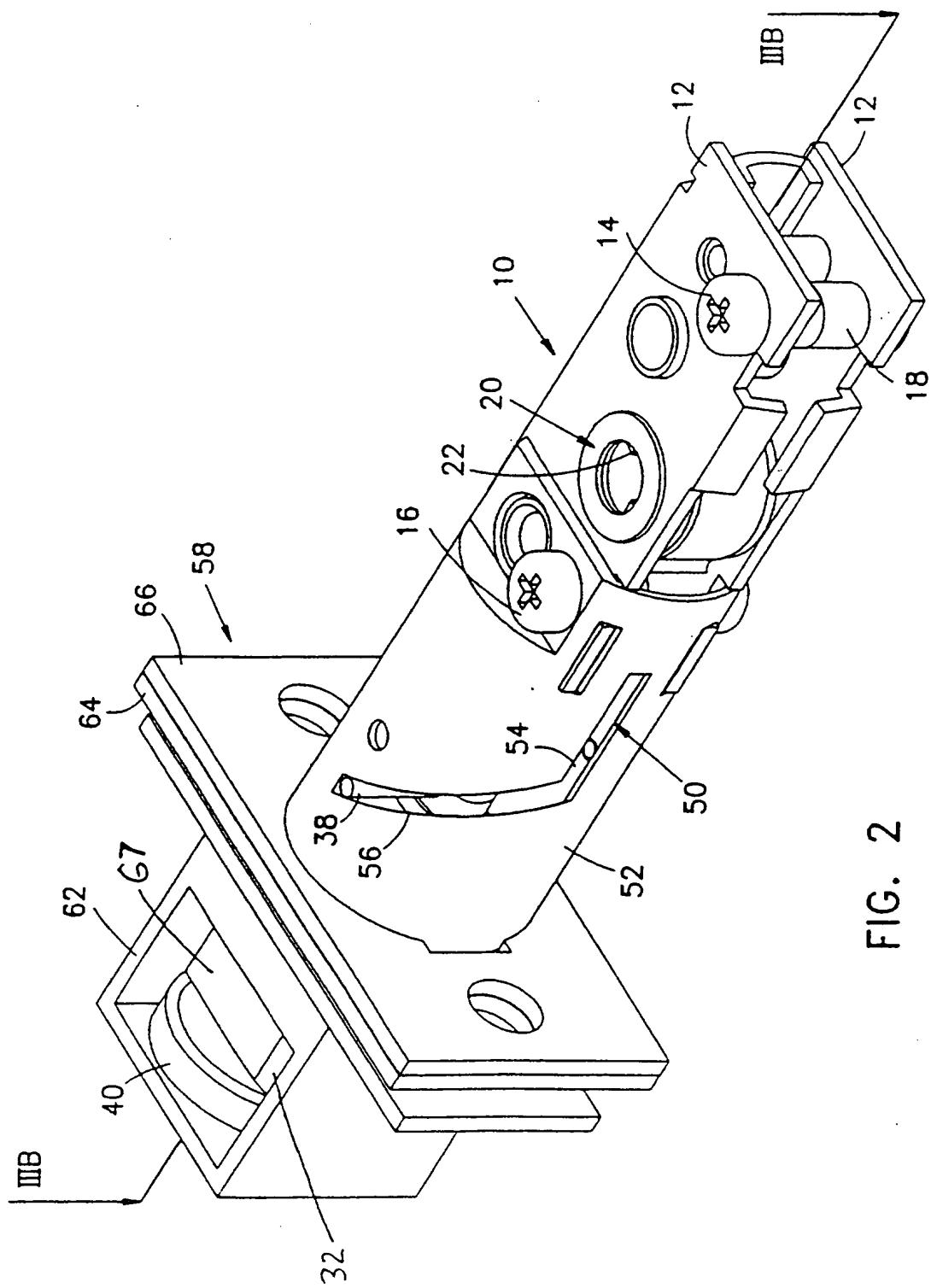


FIG. 2

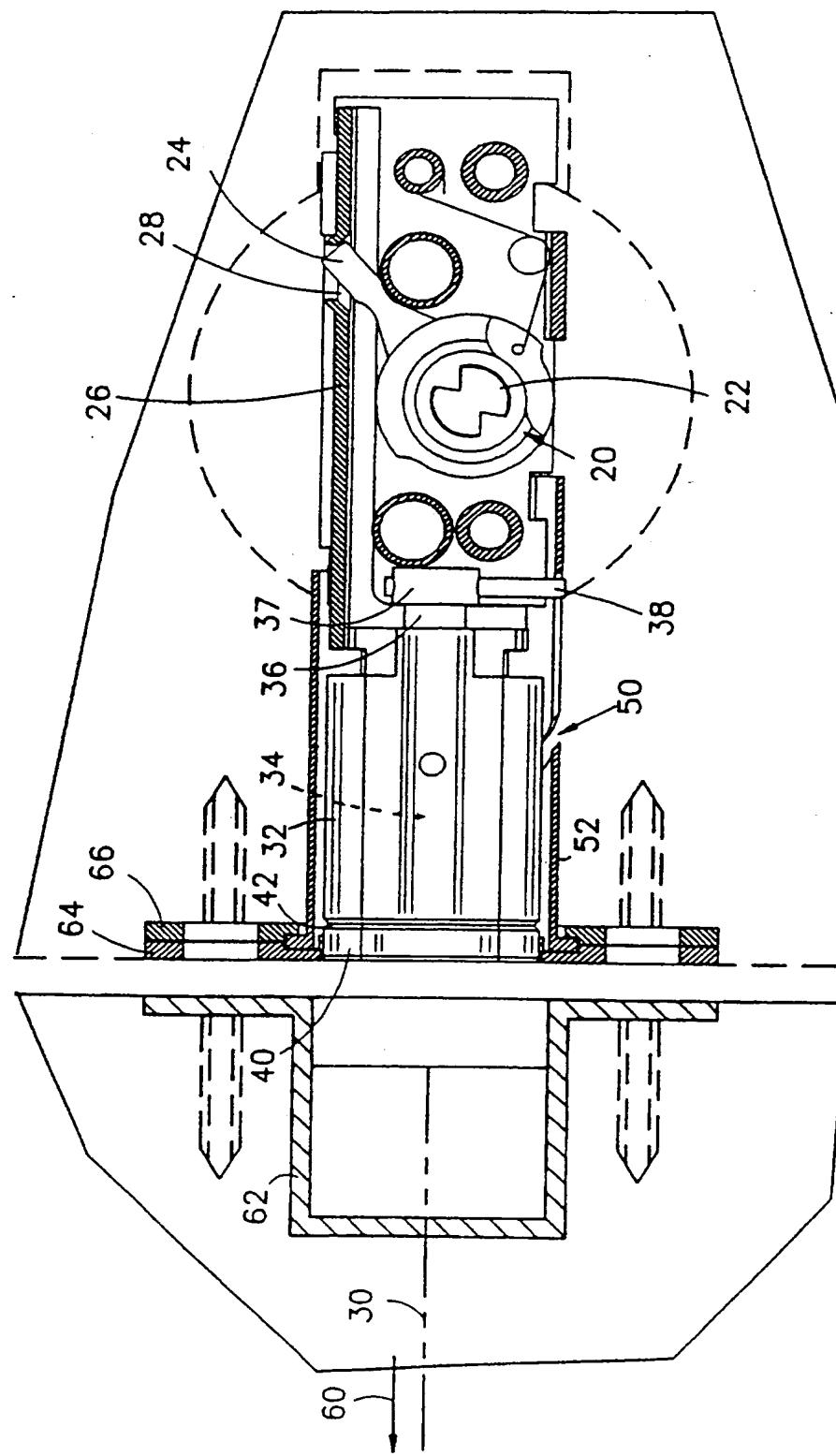


FIG. 3A

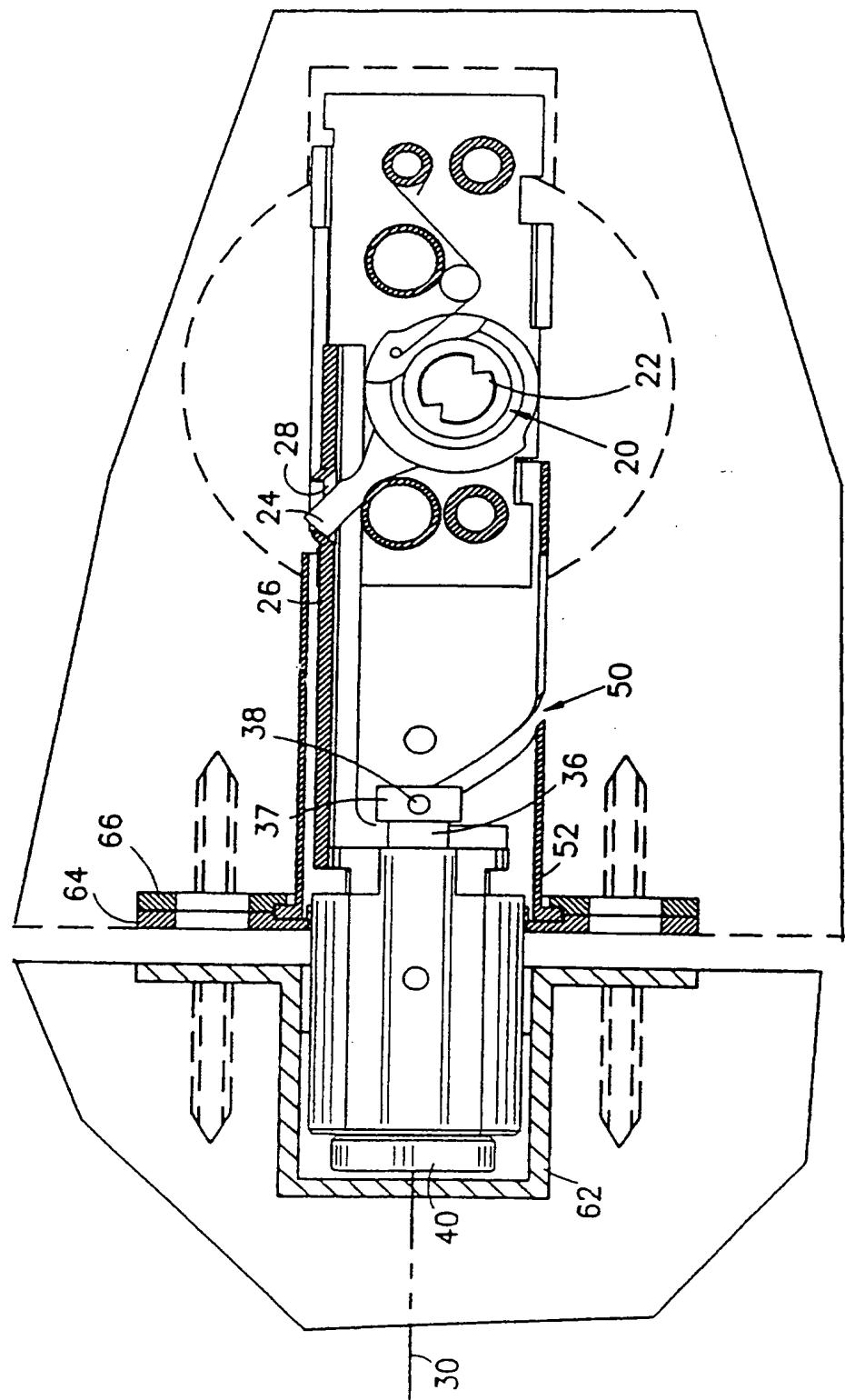


FIG. 3B

FIG. 4A

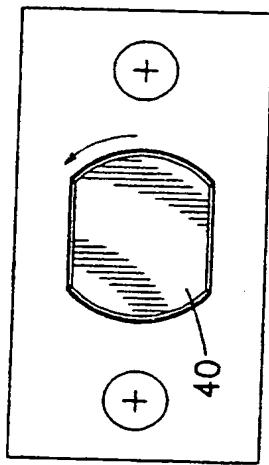


FIG. 4B

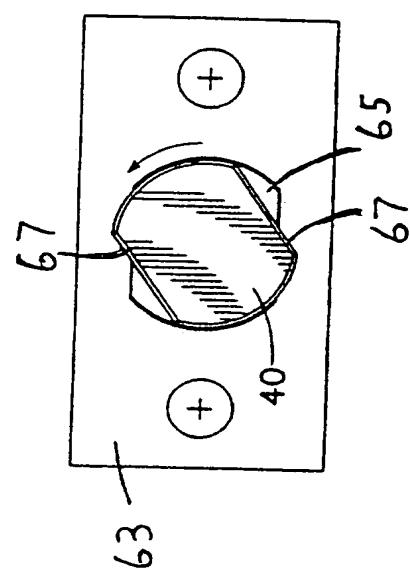
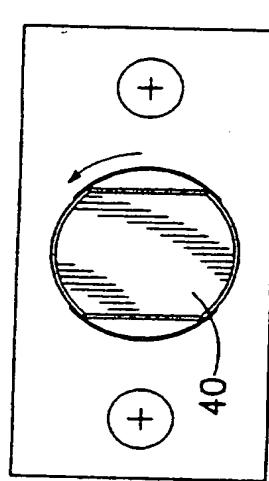


FIG. 4C



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The present invention relates to door locks generally and more particularly to deadbolt type door locks.

Various types of deadbolt locking mechanisms are known in the art. Examples of the state of the art appear in the following U.S. Patents: 4,512,597; 4,183,565; 4,111,477; 2,383,576; 1,748,599 and 1,541,093, and the prior art references mentioned therein.

U.S. Patent 4,512,597 describes a ball structure for locking the end of a deadbolt into a strike in the door frame, so as to resist forced removal of the deadbolt from the strike.

The present invention seeks to provide an improved and simplified deadbolt locking device having an auxiliary end locking mechanism.

There is thus provided in accordance with a preferred embodiment of the present invention a deadbolt locking device comprising a locking bolt which is translatable along a longitudinal axis into and out of locking engagement with a receiving strike; a bolt driving assembly for selectively translating the locking bolt along the longitudinal axis; a rotatable bolt locking element disposed at an extreme end of the locking bolt and being rotatable with respect to the locking bolt to a locked position such that translation of the locking bolt out of locking engagement with the receiving strike is prevented thereby, and apparatus for automatically rotating the rotatable bolt locking element during at least a portion of the translation of locking bolt along the longitudinal axis.

In accordance with a preferred embodiment of the present invention, the rotatable bolt locking element comprises a member which is rotatable about the longitudinal axis.

Further in accordance with a preferred embodiment of the present invention, the rotatable bolt locking element is pivotably mounted onto an end of the locking bolt.

Additionally in accordance with a preferred embodiment of the present invention apparatus for automatically rotating comprises a pin attached to the rotatable bolt locking element and a cam engaging the pin and causing rotation thereof upon translation of the locking bolt along part of its travel path.

In accordance with one embodiment of the invention, the bolt driving assembly includes a key-operated cylinder.

The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

Fig. 1 is a sectional illustration of a deadbolt locking device, constructed and operative in accordance with a preferred embodiment of the present invention, in an unlocked operative orientation;

Fig. 2 is a pictorial illustration of the device of Fig. 1 in a locked operative orientation;

Figs. 3A and 3B are sectional illustrations, taken respectively along lines 3A - 3A and 3B - 3B in respective Figs. 1 and 2; and

Figs. 4A, 4B and 4C are illustrations of a rotatable bolt locking element, taken in a direction IV in Fig. 1, in respective unlocked, partially locked and fully locked operative orientations.

Reference is now made to Figs. 1 - 4C, which illustrate a deadbolt locking device constructed and operative in accordance with a preferred embodiment of the present invention.

The deadbolt locking device preferably comprises a chassis 10 comprising a pair of chassis plates 12 which are bolted together as by bolts 14 and 16 and associated spacers 18. Rotatably mounted on chassis 10, between plates 12, is a rotary-to-linear displacement assembly 20. Assembly 20 includes a socket 22 for receiving a driving portion of a lock cylinder (not shown) or alternatively a knob. Fixedly attached to socket 22 for rotation together therewith is a displacement finger 24 which is operative to rotate from an unlocked orientation as shown in Figs. 1 and 3A to a locked orientation as shown in Figs. 2 and 3B.

Displacement finger 24 is operative to providing sliding axial displacement of a follower element 26, which is formed with a socket 28 for receiving finger 24 and which is slidable along a longitudinal axis 30. Element 26 is fixedly attached to a locking bolt 32 which is displaced thereby along axis 30.

In accordance with a preferred embodiment of the present invention, locking bolt 32 is formed with a central bore 34, preferably disposed along axis 30. Extending at least partially through bore 34 is a shaft 36 to which is mounted by means of a mounting member 37 a transversely extending pin 38. Mounted onto shaft 36 by any suitable conventional technique is a rotatable bolt locking element 40. Rotatable bolt locking element 40 typically has the same outer dimensions and cross sectional

configuration as locking bolt 32 and is rotatably disposed adjacent an end 42 thereof, preferably for rotation about the longitudinal axis 30.

Transversely extending pin 38 engages a cam slot 50 which is defined in a generally cylindrical housing 52. Housing 52 surrounds locking bolt 32, when the locking bolt is in a non-locking operative orientation. Cam 50 comprises an axial portion 54 followed by an arcuate portion 56.

It is appreciated that as locking bolt 32 is extended in a direction 60 along axis 30, pin 38 travels along cam slot 50, initially along axial portion 54 and thereafter along arcuate portion 56. As long as pin 38 travels along axial portion 54, the rotatable bolt locking element 40 is not rotated and the mutual orientations of the locking bolt 32 and the locking element are as shown in Fig. 4A.

Once the pin 38 begins to travel along the arcuate portion 56, which is preferably after the end 42 of the bolt has passed into a strike 62, normally mounted onto a door frame (not shown), the rotatable bolt locking element 40 begins to rotate relative to the locking bolt 32, as illustrated in Fig. 4B.

When locking bolt 32 is fully extended, as shown in Figs. 2 and 3B, the pin 38 is located at the end of the arcuate portion 56 and the rotatable bolt locking element 40, as seen in Fig. 4C, is rotated by 90 degrees with respect to its original orientation, shown in Fig. 4A.

In this orientation, the rotatable bolt locking element 40 is positioned so that it prevents the locking bolt 32 to which

it is attached from being pulled out of strike 62. This is because the locking bolt 32 and locking element 40 have the same part-circular cross section with opposed flats 67 (as seen particularly in Figures 4A-4C). When the bolt 32 and 5 element 40 are aligned, they can just pass through a hole 65 of complementary shape in a front plate 63 of the strike 62. However, when rotated relatively to the bolt 32 and hole 65, the element 40 is obstructed by the plate 63 and cannot pass back through the hole 65.

10 A door mounted strike 58 is attached by conventional means to housing 52 and typically includes a pair of parallel apertured plates 64 and 66. In accordance with one embodiment of the invention, the outer plate 64 may be modular and decorative such that its colour and finish may 15 be matched to that of strike 62. Alternatively, a thin cover plate (not shown) may be placed over outer plate 60 for decorative purposes.

CLAIMS

1. A locking device comprising a locking bolt which is translatable along a longitudinal axis into and out of locking engagement with a receiving strike; a bolt driving assembly for selectively translating the locking bolt along the longitudinal axis; a rotatable bolt locking element disposed at an extreme end of the locking bolt and being rotatable with respect of the locking bolt to a locked position such that translation of the locking bolt out of locking engagement with the receiving strike is prevented thereby; and apparatus for automatically rotating the rotatable bolt locking element during at least a portion of the translation of the locking bolt along the longitudinal axis.
2. A device according to claim 1, wherein the rotatable bolt locking element comprises a member which is rotatable about the longitudinal axis.
3. A device according to claim 1 or claim 2, wherein the rotatable bolt locking element is pivotably mounted onto an end of the locking bolt.
4. Apparatus according to any one of the preceding claims, wherein the apparatus for automatically rotating comprises a pin attached to the rotatable bolt locking element and a cam slot engaging the pin and causing rotation thereof upon translation of the locking bolt along part of its travel path.
5. A device according to any one of the preceding claims, wherein the bolt driving assembly includes a key-operated cylinder.
6. A locking device, substantially as described with reference to the accompanying drawings.



Application No: GB 9517362.1
Claims searched: 1 - 6

Examiner: Peter Weller
Date of search: 15 November 1995

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.N): E2A (AARL AARE)

Int CI (Ed.6): E05B 63/12 E05C 1/06

Other: NONE

Documents considered to be relevant:

Category	Identity of document and relevant passage			Relevant to claims
X	US 4897961	SHINE	- FIGURES 2 & 3	1,3
X	US 4615550	ABATE	- FIGURE 2A, 2B, 2C	1,3
X	US 4566725	KLEIN	- FIGURES 1-3	1,3
X	US 4095827	STAVENAU	- FIGURES 3-6	1,3

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.